

REMARKS/ARGUMENTS

Status of the Claims

Prior to making this amendment, claims 1-28, 34 and 35 were pending in this application. By the present amendment, claim 1 has been amended to omit reference to amplitude modulation, to include some language from claim 3 and to require that there are two states of the modulator differing in phase shift of the reflected wave. Binary encoding by switching between two phase states is taught by page 9 lines 8-11 and page 10 lines 15-26. The phrase "phase shifted" is used at page 10 line 8. A specific form of such phase shifting is the subject of claim 5. Corresponding amendments have been made to the independent claims 21 and 28. Claims 2-4, 22 and 23 have been deleted. Claim 16 has been amended to omit reference to amplitude modulation. New dependent claims 36 to 42 have been added.

The new claims 36,39 and 41 are based on page 4 line 7. New claim 37 is an apparatus claim based on method claim 26. New claim 38 is supported by page 10 lines 15-26 and new claims 40 and 42 are supported by page 5 lines 23-30 and page 10 lines 15-19. Hence, after the entry of this Amendment claims 1, 5-21, 24-28, and 34-42 are pending for examination. No new matter is added by the amendments.

Rejection under 35 USC 102

The Office Action rejected claims 1-8, 10-12, 14-17, 20-25 and 28 under 35 USC 102(e) as anticipated by Dubinsky US 6757218. It is Applicants' position that the independent claims 1, 21 and 28 as now amended are novel over Dubinsky. These claims require that the downhole modulation shifts the phase of the reflected signal and that detection at the surface is phase-related.

Dubinsky discloses a system which relies on amplitude modulation. His column 3 lines 6 to 9 states that the reflected signal may be bi-level or multi-level. The term bi-level is explained at column 4 lines 61 and 62 as two differing amplitude states. The term multi-level is explained at column 5 lines 27 and 28 as multiple amplitudes. Nowhere does Dubinsky teach that

phase should be changed in order to impose a signal on the reflected wave. Column 5 line 12 mentions in passing that reflection of the signal might alter phase, but this is Dubinsky's only reference to phase and it is not teaching the shifting of phase between two states. Nothing in Dubinsky discloses the requirement of the independent claims to detect phase related information at the surface. Thus the independent claims 1, 21 and 28 are novel and the claims dependent on them must also be novel. It is respectfully requested that the rejections under 35 USC 102 are withdrawn.

Rejection under 35 USC 103

In the Office Action claims 9, 13 and 26 were rejected as obvious over Dubinsky. It is respectfully submitted that the independent claims 1, 21 and 28 as now amended are not obvious over Dubinsky.

Dubinsky contains no teaching or suggestion to use phase to impose a signal on the reflected acoustic carrier. Secondly, Dubinsky does not disclose a carrier wave and reflector capable of providing phase shifted modulation. Phase shifting which requires some relationship between the frequency of the carrier signal and the resonant frequency of the phase shifting reflector. Dubinsky describes an arrangement in which the acoustic signal is a series of pulses. These pulses are transmitted at regular intervals, but what frequency or range of frequencies is being transmitted and interrupted to form the train of pulses is not disclosed. The reflectors shown by Dubinsky are intended to reflect the signal with and without attenuation. Even if the acoustic signal of Dubinsky was capable of being reflected with a distinct shift in phase (which is not disclosed) Dubinsky does not describe reflectors capable of interacting with the carrier wave in such a way as to reflect it with a definite shift in phase.

Phase modulation is advantageous compared to amplitude modulation because it gives a better signal to noise ratio.

Referring to the rejection of claim 26 in the office action, it is respectfully submitted that following the amendment to claims 1, 21 and 28, the arguments against claim 26

can now only be applied if it is presupposed that phase shift is being used, which (as stated above) above is not taught by Dubinsky.

Matching frequency to that of the resonator is nowhere present in Dubinsky and would have no purpose in the context of Dubinsky's amplitude modulation where the reflector switches between different amounts of attenuation of the signal.

The rejection of claims 9 and 13 is believed to be moot in view of the amendments to the independent claim 1.

The Office Action rejected claims 18, 19, 34 and 35 as obvious from a combination of Dubinsky with Priest et al US 5,444,324. It is respectfully submitted that these rejections are now moot in view of the amendments to claims 1, 21 and 28. Moreover, Priest et al is concerned with a mechanism which amplifies the mechanical displacement of a piezoelectric acoustic transducer when electrical power is applied to the piezoelectric element. In short it is about a more efficient transducer. This transducer needs to be powered by other power supplies such as a wireline cable or a battery. It is not powered by an acoustic wave transmitted from the surface and therefore it is not relevant to an arrangement as claimed by claims 19 and 34 nor can it sensibly be combined with Dubinsky.

The Office Action rejected claim 27 as obvious over Dubinsky together with Lavigne US 3,909,775. It is submitted that this rejection is moot in view of the amendments to claim 21. In addition, Lavigne is concerned with a very different utilization of acoustic waves. Lavigne is concerned with an acoustic downhole logging tool which transmits acoustic energy over a wide range of frequencies into the downhole formation to record and analyse the frequency response of that subterranean formation. This is entirely different from the subject matter of claim 27 which is to tune the carrier frequency generated on the surface to arrive at a match with the resonant frequency of the downhole resonator for subsequent telemetry.

For the reasons given above applicants believe that all claims are novel and non-obvious over the cited documents. It is requested that the rejections under 35 USC 102 and 35 USC 103 are withdrawn.

CONCLUSION

In view of the foregoing, Applicants believe all claims now pending in this Application are in condition for allowance. The issuance of a formal Notice of Allowance at an early date is respectfully requested.

In the event that a fee or refund is due in connection with this Amendment, the Commissioner is hereby authorized to charge any underpayment or credit any overpayment to Deposit Account No 19-0615. If the Examiner believes a telephone conference would expedite prosecution of this application, please telephone the undersigned at (617)-768-2421.

Respectfully submitted,

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